WHAT IS CLAIMED IS:

1. A bandwidth management apparatus for use in a network in which a plurality of nodes, including two or more edge nodes connected to other networks or users, are connected by links, said bandwidth management apparatus for managing the reservation of a bandwidth by each of said edge node, comprising:

a link-bandwidth table for recording a residual bandwidth of each of said links; and

an admissible bandwidth calculating device for calculating an admissible bandwidth in response to a received bandwidth reservation request containing requested bandwidth information representing a requested bandwidth for reservation and destination information representing destination edge nodes;

wherein said admissible bandwidth calculating device includes: a residual bandwidth calculating part which decides whether the reservation of said requested bandwidth is unacceptable or acceptable, depending on whether the residual bandwidth of at least one of all links from an arbitrary one of said edge node to all of said destination edge nodes is less or more than a bandwidth necessary for reservation based on said requested bandwidth; and a bandwidth reservation part which, if the reservation of said requested bandwidth is acceptable, updates the residual bandwidth in said link-bandwidth table corresponding to each link of the shortest path to each destination edge node by subtracting said bandwidth necessary for reservation from said residual bandwidth.

2. A bandwidth management apparatus for use in a network in which a plurality of nodes, including two or more edge nodes connected to other networks or users, are connected by links, said bandwidth management

apparatus for managing the reservation of a bandwidth by each of said edge node, comprising:

a link-bandwidth table for recording the maximum admissible bandwidth and a pre-reserved bandwidth of each of said links; and

an admissible bandwidth calculating device for calculating an admissible bandwidth in response to a received bandwidth reservation request containing requested bandwidth information representing a requested bandwidth for reservation and destination information representing destination edge nodes;

wherein said admissible bandwidth calculating device includes: a residual bandwidth calculating part which calculates the residual bandwidth of each link of the shortest path to each of said destination edge nodes of said bandwidth reservation request from said pre-reserved bandwidth and said maximum admissible bandwidth of said link-bandwidth table, and decides whether the reservation of said requested bandwidth is unacceptable or acceptable, depending on whether the residual bandwidth of at least one of said links is less or more than a bandwidth necessary for reservation based on said requested bandwidth for reservation; and a bandwidth reservation part which, if the reservation of said requested bandwidth is acceptable, updates the residual bandwidth in said link-bandwidth table corresponding to each link of the shortest path to each destination edge node by subtracting said bandwidth necessary for reservation from said residual bandwidth.

3. The apparatus of claim 1, wherein said bandwidth reservation part includes means for limiting the bandwidth reservation of the same request by the same edge node for each link to one reservation and updating said residual bandwidth, and wherein said bandwidth necessary for reservation is said requested bandwidth for reservation.

4. The apparatus of claim 2, wherein said bandwidth reservation part includes means for limiting the bandwidth reservation of the same request by the same edge node for each link to one reservation and updating said residual bandwidth, and wherein said bandwidth necessary for reservation is said requested bandwidth for reservation.

5. The apparatus of any one of claims 1, 2, 3, and 4, further comprising means for sending said bandwidth reservation request to said edge nodes except that making said bandwidth reservation request when it is decided that the reservation of said requested bandwidth is acceptable.

6. The apparatus of any one of claims 1, 2, 3, and 4, wherein said destination edge nodes are all of said edge nodes except said edge node making said bandwidth reservation request.

7. A bandwidth management method for said bandwidth management apparatus of claim 1, which refers to a link-bandwidth table with each link and its residual bandwidth recorded thereon and decides whether the reservation of a bandwidth in a received bandwidth reservation request is acceptable or not, said method comprising the steps of:

(a) responding to said received bandwidth reservation request containing a requested bandwidth for reservation and destinations to read out of said link-bandwidth table the residual bandwidth for said each link of the shortest path to each of said destinations;

(b) deciding whether the reservation of said requested bandwidth is acceptable or not, depending on whether the residual bandwidth of every link on the shortest paths to all of said destination edge nodes is more or less than a bandwidth necessary for reservation based on said requested bandwidth for reservation; and

(c) updating said residual bandwidth in said link-bandwidth table

corresponding to the link of each of said shortest paths to said destination edge nodes by subtracting said bandwidth necessary for reservation from said residual bandwidth when it is decided in said step (b) that said residual bandwidth is more than said bandwidth necessary for reservation.

8. A bandwidth management method for said bandwidth management apparatus of claim 2, which refers to a link-bandwidth table with each link and its residual bandwidth recorded thereon and decides whether the reservation of a bandwidth in a received bandwidth reservation request is acceptable or not, said method comprising the steps of:

(a) responding to said received bandwidth reservation request containing a requested bandwidth for reservation and destinations to read out of said link-bandwidth table the residual bandwidth for said each link of the shortest path to each of said destinations and to calculate of said each link;

(b) deciding whether the reservation of said requested bandwidth is acceptable or not, depending on whether the residual bandwidth of every link on the shortest paths to all of said destination edge nodes is more or less than a bandwidth necessary for reservation based on said requested bandwidth for reservation; and

(c) updating said residual bandwidth in said link-bandwidth table corresponding to the link of each of said shortest paths to said destination edge nodes by subtracting said bandwidth necessary for reservation from said residual bandwidth when it is decided in said step (b) that said residual bandwidth is more than said bandwidth necessary for reservation.

9. The method of claim 7, wherein the updating of said residual bandwidth by all the edge nodes for the links of the shortest paths to said destination edge nodes based on the same bandwidth reservation request in said sep (c) is limited to one time, and wherein said bandwidth necessary for

reservation is said requested bandwidth for reservation.

10. The method of claim 8, wherein the updating of said residual bandwidth by all the edge nodes for the links of the shortest paths to said destination edge nodes based on the same bandwidth reservation request in said step (c) is limited to one time, and wherein said bandwidth necessary for reservation is said requested bandwidth for reservation.

11. The method of any one of claims 7, 8, 9 and 10, further comprising the step of;

(d) sending said bandwidth reservation request to said edge nodes except that making said bandwidth reservation request when it is decided in said step (c) that the reservation of said requested bandwidth is acceptable.

12. The method of any one of claims 7, 8, 9 and 10, wherein said destination edge nodes are all of said edge nodes except said edge node making said bandwidth reservation request.

13. A program which describes the procedure for implementing, by a computer, a bandwidth management method in said bandwidth management apparatus of claim 1, which refers to a link-bandwidth table with each link and its residual bandwidth recorded thereon and decides whether the reservation of a bandwidth in a received bandwidth reservation request is acceptable or not, said program comprising the steps of:

(a) responding to said received bandwidth reservation request containing a requested bandwidth for reservation and destinations to read out of said link-bandwidth table the residual bandwidth for said each link of the shortest path to each of said destinations;

(b) deciding whether the reservation of said requested bandwidth is acceptable or not, depending on whether the residual bandwidth of every link on the shortest paths to all of said destination edge nodes is more or less than

a bandwidth necessary for reservation based on said requested bandwidth for reservation; and

(c) updating said residual bandwidth in said link-bandwidth table corresponding to the link of each of said shortest paths to said destination edge nodes by subtracting said bandwidth necessary for reservation from said residual bandwidth if it is decided in said step (b) that said residual bandwidth is more than said bandwidth necessary for reservation.

14. A bandwidth management method for said bandwidth management apparatus of claim 2, which refers to a link-bandwidth table with each link and its residual bandwidth recorded thereon and decides whether the reservation of a bandwidth in a received bandwidth reservation request is acceptable or not, said program comprising the steps of:

(a) responding to said received bandwidth reservation request containing a requested bandwidth for reservation and destinations to read out of said link-bandwidth table the residual bandwidth for said each link of the shortest path to each of said destinations and to calculate of said each link;

(b) deciding whether the reservation of said requested bandwidth is acceptable or not, depending on whether the residual bandwidth of every link on the shortest paths to all of said destination edge nodes is more or less than a bandwidth necessary for reservation based on said requested bandwidth for reservation; and

(c) updating said residual bandwidth in said link-bandwidth table corresponding to the link of each of said shortest paths to said destination edge nodes by subtracting said bandwidth necessary for reservation from said residual bandwidth when it is decided in said step (b) that said residual bandwidth is more than said bandwidth necessary for reservation.

15. The procedure of said program of claim 13, wherein the updating

of said residual bandwidth by all the edge nodes for the links of the shortest paths to said destination edge nodes based on the same bandwidth reservation request in said sep (c) is limited to one time, and wherein said bandwidth necessary for reservation is said requested bandwidth for reservation.

16. The procedure of said program of claim 14, wherein the updating of said residual bandwidth by all the edge nodes for the links of the shortest paths to said destination edge nodes based on the same bandwidth reservation request in said step (c) is limited to one time, and wherein said bandwidth necessary for reservation is said requested bandwidth for reservation.

17. The procedure of said program of any one of claims 13, 14, 15 and 16, further comprising the step of;

(d) sending said bandwidth reservation request to said edge nodes except that making said bandwidth reservation request when it is decided in said step (c) that the reservation of said requested bandwidth is acceptable.

18. The procedure of said program of any one of claims 13, 14, 15 and 16, wherein said destination edge nodes are all of said edge nodes except said edge node making said bandwidth reservation request.

19. A recording medium having recorded thereon said program of claim 13 or 14.